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Baker Bay West Channel Sediment Evaluation


## Abstract

Sediments from shoals in the Baker Bay West Channel were sampled and subjected to physical and chemical anlyses. Results showed the material to be acceptable for both in-water and upland disposal. These results also confirm those of earlier studies going back as far as 1979.


## Introduction

1. The West Channel through Baker Bay to Ilwaco starts in the Columbia River at RM 2.5 near the southeast side of Sand Island. The authorized Federal Project is 16 feet deep, 150 to 200 feet wide, and 3.2 miles long extending along the west side of Sand Island to the Ilwaco boat basin. Maintenance dredging of about 50,000 cy is done annually by hopper, pipeline or clamshell. Usually 3 to 4 shoals form in the channel at regular locations. These are at channel miles 0.3, 1.4, 1.7, and 3.1. The last shoal at Channel mile (CM) 3.1 is near the entrance to the boat basin at Ilwaco. It typically contains finer grained sediment than the others. Periodically the shoals are sampled and run through physical tests to characterize the sediment. If necessary, chemical tests for contaminants are conducted. These tests, are used to determine if the sediment meets requirements of the Clean Water Act (CWA) for both in-water or upland disposal. Such testing was conducted in 1980, 81, 83, and 87 and the resulting sediment evaluations showed the sediment to be acceptable for in-water and upland disposal (1, 2, 3, 4). The material has been disposed upland along the west side of Sand Island or in-water at Area D. In March of 1992 three shoals were sampled to evaluate the acceptability of disposal at Area D, Sand Island, and a new in-water flow lane site at Columbia River mile 2.5.

## Methods

2. There are three shoals according to recent surveys that make the channel about 1 foot above the 16 foot authorized depth. Three samples were taken from these shoals by U. S. Army Corps of Engineers (USACE) and National Marine Fisheries Service (NMFS) personnel, using a modified 0.96m$^2$ Gray O'Hara box corer, on 19 March 1992 at locations shown on the enclosed map. All three samples were cold stored in plastic baggies and were subjected to physical analyses for grain size distribution and volatile solids content. Initial field observations of the sediment samples indicated that no additional testing, other than routine physical analyses, would be necessary to evaluate the suitability of the material for unconfined in-water or upland disposal except material from the shoal at CM 2.9. Because this shoal consistently contains fine grained material that is usually greater than 70 % silt, the shoal sample, BB-BC-3, was also subjected to chemical analyses for contaminants. The sample was cold stored in an EPA approved, Picher brand, glass container that was acid and hexane rinsed according to EPA/USACE protocols and topped with a teflon lined lid. The sample was tested for heavy metals, polynuclear aromatic hydrocarbons (PAHs), Pesticides, polychlorobiphenyls (PCBs), acid volatile sulfides (AVS), phenols, and tributyltin (TBT). All sampling and analyses were performed according to EPA/USACE approved methods (5). A quality control (QC) and quality assurance (QA) report of the results was prepared by the USACE, Portland District Materials Lab in Troutdale, Oregon.

## Results/discussion

3. Table 1 shows results of physical analyses of the sediment samples. The sediments in the shoals are predominantly medium sands except that at CM 2.9, which is, as expected, a medium to coarse silt (BB-BC-3). The percent volatile solids are low for all three samples indicating a low organic content. The grain size for the samples BB-BC-1 and 2 is similar to that of the proposed in-water disposal sites. The disposal site grain sizes range from 0.19 to 0.29 mm (6, 7, 8, 9). The results of this round of sampling of channel sediments show that the sediments have not changed over time. Typically, the sediments from CM 0 to 2.0 are sandy while those from CM 2.0 to 3.0 become progressively more silty.

4. Table 2 shows the results of chemical analyses of sediment from the shoal at CM 2.9. Metals concentrations were below established concern levels. The results corroborate those of earlier sediment evaluations (1, 2, 3, 4). Pesticides and PCBs were undetected. Acid volatile sulfide (AVS), at 0.55 µmoles/g, was lower than that of 10 other samples taken concurrently in Baker Bay (10, 11). PAHs were below concern levels. Of the phenolics, only phenol at 110 ppb was detected. However, it was also detected in the method blank solution and therefore the result is suspect. QA/QC from the contract labs was acceptable according to the enclosed USACE, Portland District Materials Lab report.

5. Elutriate tests of sediment from this shoal, conducted in 1987, showed that water quality criteria were met for all contaminants tested except ammonia. However, it was concluded that receiving water from the high energy regime at the in-water disposal site would rapidly dilute ammonia to below toxicity levels. Elutriate tests performed in 1980 showed ammonia levels only slightly exceeding guidelines. In the case of upland disposal it is anticipated that the finer grained material from the shoal at CM 2.9 will enrich the soil at the Sand Island disposal site. Wiering the site will reduce turbidity and help control ammonia levels to below toxicity concerns by controlling the flow and mixing of runoff with receiving waters.

6. According to provisions of the Clean Water Act (CWA) the sediment from the Baker Bay West Channel is acceptable for both unconfined in-water and upland disposal. Results from earlier studies showed that, sediments from CM 0.0 to 2.0 meet the exclusionary criteria of the CWA for testing while that from CM 2.0 to 3.0, though finer grained, is also acceptable. Chemical tests suggested that no adverse toxicological environmental impacts would be expected from its disposal. The results from the current study confirm these conclusions. Physical impacts from disposal would be minimal because of the high energy, dispersive nature of the disposal sites. The impact to benthics at in-water sites would be minimal since most of the finer grained material would be rapidly dispersed. It is probable that the populations of benthics at these high energy sites rapidly adapt to changing conditions. A temporary, local increase in turbidity would be expected at both the in-water and upland sites. Returning water from the upland site should meet water quality criteria except for perhaps, ammonia. However, ammonia concentrations would be rapidly diluted by receiving waters. This also would be true at the in-water sites.

## Recommendations

7. Sediments from Baker Bay West Channel are acceptable for unconfined in-water and

upland disposal according to provisions of the CWA. No unacceptable adverse environmental impacts are expected from its disposal at Area D, the flow lane site at RM 2.5, or at Sand Island. The results of this sediment evaluation corroborate those from earlier sediment evaluations of the Baker Bay West Channel that have been conducted periodically since 1979.

8. This sediment quality report was prepared by Jim Britton, U. S. Army Corps of Engineers, Portland District, Reservoir Regulation and Water Quality Section (326-6471).

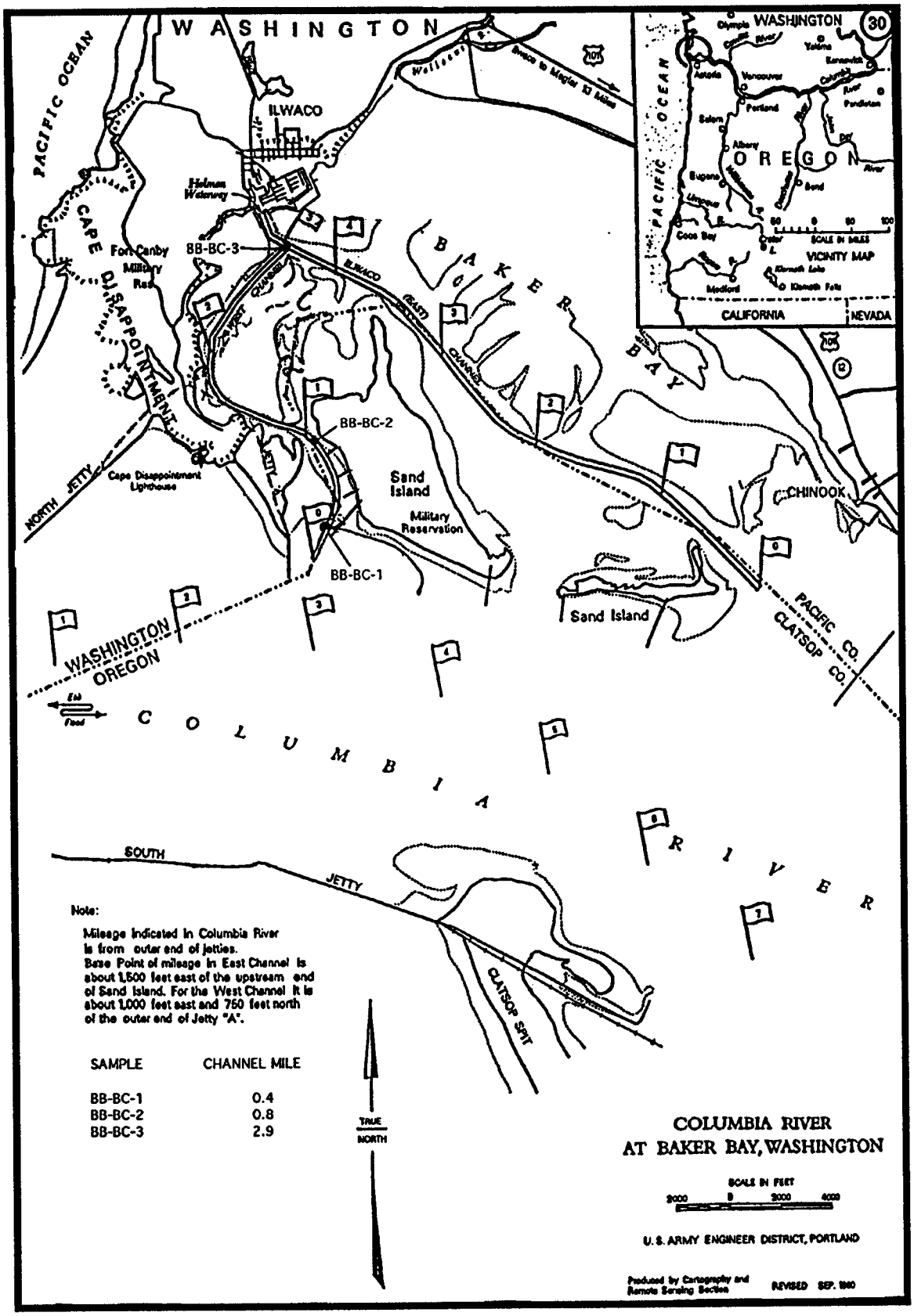
WASHINGTON
PACIFIC OCEAN
ILWACO
Wallacetown
Bruce to Megler 13 Miles
Helmus Waterway
CAPE DISAPPOINTMENT
Fort Canby Military Res.
BB-BC-3
ILWACO CHANNEL
BAKER BAY
BB-BC-2
Sand Island
Military Reservation
Cape Disappointment Lighthouse
NORTH JETTY
BB-BC-1
CHINOOK
Sand Island
WASHINGTON
OREGON
PACIFIC CO.
CLATSOP CO.
COLUMBIA RIVER
SOUTH JETTY
CLATSOP SPIT
Ebb
Flood
TRUE NORTH
WASHINGTON
OREGON
CALIFORNIA
NEVADA
VICINITY MAP
SCALE IN MILES
Note:
Mileage indicated in Columbia River is from outer end of jetties. Base Point of mileage in East Channel is about 1,500 feet east of the upstream end of Sand Island. For the West Channel it is about 1,000 feet east and 750 feet north of the outer end of Jetty "A".
SAMPLE CHANNEL MILE
BB-BC-1 0.4
BB-BC-2 0.8
BB-BC-3 2.9
COLUMBIA RIVER
AT BAKER BAY, WASHINGTON
SCALE IN FEET
U. S. ARMY ENGINEER DISTRICT, PORTLAND
Produced by Cartography and Remote Sensing Section
REVISED SEP. 1980

Table 1

Results of physical analyses of sediment from Baker Bay West Channel.

| sample | mm | % | | | |
|---|---|---|---|---|---|
| | mean grain size | sand | silt | clay | volatile solids |
| BB-BC-1 | 0.26 | 100 | 0.0 | 0.0 | 0.4 |
| BB-BC-2 | 0.30 | 99.1 | 0.1 | 0.0 | 0.4 |
| BB-BC-3 | 0.03 | 13.3 | 79.6 | 7.1 | 4.7 |

Table 2

Results of chemical analyses of sediment from Baker Bay West Channel at channel mile 2.9.

| sample | metals | | | | | | | | organics | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AS | Cd | Cr | Cu | Hg | Ni | Pb | Zn | pest | PCBs | PAHs | phenol |
| | ppm | | | | | | | | ppb | | | |
| BB-BC-3 | 7 | 0.7 | 19 | 26 | 0.08 | 16 | 17 | 96 | ND | ND | 322 | 110* |
| DL* | 1 | 0.1 | 1 | 1 | 0.02 | 1 | 1 | 1 | 2 | 10 | 62 | 62 |

* detection limit

# REFERENCES


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4. Turner, R. and Babcock, S. U. S. Army Corps of Engineers, Portland District. December 1988. Results of 1987 Baker Bay at Ilwaco, WA Sediment Quality Testing.

5. U. S. Environmental Protection Agency and U. S. Army Corps of Engineers. February 1991. Evaluation of Dredged Material Proposed for Ocean Disposal (Testing Manual).

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